

What is claimed is:

1. A method of making a metallic shell for a spark plug, the metallic shell including a multi-stepped through hole, an intermediate tubular portion, a tip end side tubular portion disposed on a tip end side of the intermediate tubular portion and a base end side tubular portion disposed on a base end side of the intermediate tubular portion, the through hole including, in the order from a base end side to a tip end side of the spark plug, a large diameter hole section, an intermediate diameter hole section smaller in diameter than the large diameter hole section and a small diameter hole section smaller in diameter than the intermediate diameter hole section, the method comprising the steps of;

cutting a metal pipe that is used as a starting material to a predetermined length and thereby preparing a pipe-shaped blank; and

subjecting the blank to a deformation process and thereby forming the blank into the metallic shell.

2. A method according to claim 1, wherein an inner diameter of the pipe is larger than a diameter of the small diameter hole section and smaller than a diameter of the large diameter hole section.

3. A method according to claim 1 wherein an inner diameter of the pipe is equal to a diameter of the small diameter hole section.

30

4. A method according to claim 1, wherein an outer diameter of the pipe is larger than that of the tip end

side tubular portion of the metallic shell and smaller than that of the intermediate tubular portion.

5. A method according to claim 1, further comprising:

5 after the step of cutting, a second step of forming by extrusion a tip end side portion of the blank into the tip end side tubular portion smaller in outer diameter than the blank;

10 a third step of processing a base end side of the blank by extrusion to partially expand a through hole of the blank and thereby forming the large diameter hole section;

15 a fourth step of processing the base end side of the blank by extrusion and thereby forming the base end side tubular portion that is smaller in outer diameter than the blank while at the same time forming the intermediate tubular portion; and

20 a fifth step of processing the base end side of the blank by extrusion to partially expand the through hole of the blank and thereby forming the intermediate diameter hole section while at the same time forming the small diameter hole section.

6. A method according to claim 1, further comprising:

25 after the step of cutting, a second step of forming by extrusion a tip end side portion of the blank into the tip end side tubular portion smaller in outer diameter than the blank;

30 a third step of processing a base end side of the blank by extrusion to partially expand a through hole of the blank and thereby forming the large diameter hole section;

a fourth step of processing the base end side of the blank by extrusion to partially expand the through hole of the blank and thereby forming the intermediate diameter hole section while at the same time forming the  
5 small diameter hole section; and

a fifth step of processing the base end side of the blank by extrusion and thereby forming the base end side of the blank into the base end side tubular portion smaller in outer diameter than the blank while at the  
10 same time forming the intermediate tubular portion.

7. A method according to claim 1, wherein a final shape of the metallic shell is of such dimensions that a length L from an end face of the intermediate tubular  
15 portion to a tip end face of the tip end side tubular portion exceeds 19 mm.

8. A method according to claim 1, wherein the final shape of the metallic shell is of such dimensions that a  
20 tip end diameter D of the tip end side tubular portion is less than 10.5 mm.

9. A method according to claim 1, wherein a final shape of the metallic shell is sized so that an axial  
25 length T of the small diameter hole section exceeds 2 mm.

10. A method of making a metallic shell for a spark plug, the metallic shell including a concentric through hole, an intermediate tubular portion, a tip end side tubular portion disposed on a tip end side of the intermediate tubular portion and a base end side tubular portion disposed on a base end side of the intermediate tubular portion, the through hole including, in the  
30

order from a base end side to a tip end side of the spark plug, a large diameter hole section, an intermediate diameter hole section smaller in diameter than the large diameter hole section and a small 5 diameter hole section smaller in diameter than the intermediate diameter hole section, the method comprising the steps of;

cutting a metal pipe that is used as a starting material to a predetermined length and thereby preparing 10 a pipe-shaped blank;

subjecting the blank to a deformation process and thereby forming the blank into the metallic shell;

installing an insulator assembly having an insulator in which a center electrode and a terminal member are installed in the metallic shell by inserting 15 the insulator assembly into the metallic shell from the base end side thereof; and

joining an end of a ground electrode to a tip end of the metallic shell and making another end side of the 20 ground electrode be disposed opposite to the center electrode.

11. A spark plug comprising:

an insulator having an axial through hole;

25 a center electrode disposed in the through hole of the insulator so as to be positioned at a tip end side thereof;

a metallic shell having a multi-stepped through hole within which the insulator is disposed; and

30 a ground electrode having an end connected to the metallic shell and the other end portion disposed opposite to the center electrode;

wherein the metallic shell is formed from a metal pipe having a predetermined inner diameter, a smallest diameter hole section of the multi-stepped through hole of the metallic shell having a diameter equal to the  
5 inner diameter of the pipe.

12. A spark plug according to claim 11, wherein the smallest diameter hole section is of an axial length T that exceeds 2 mm.

10

15

20

25

30